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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/692,024

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Ralf Staub

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EXAMINER

ESTRADA, MICHELLE

ART UNIT

PAPER NUMBER

2823

DATE MAILED: 08/01/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/692,024

Applicant(s)

STAUB ET AL.

Examiner

Michelle Estrada

Art Unit

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 10 July 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 11 and 14-24 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 11 and 14-24 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### **DETAILED ACTION**

The Examiner withdrew the finality of the office action mailed 5/9/06 in view of the arguments filed 7/10/06.

#### ***Specification***

The disclosure is objected to because of the following informalities: in page 8, reference number 31 is called two different things "two diffusion regions" in paragraph [0026], and "source/drain electrode" in paragraph [0027]. This is confusing and unclear.

Appropriate correction is required.

#### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 11, 14 and 16 are rejected under 35 U.S.C. 102(b) as being anticipated by Kubota (5,065,215).

Re claim 11, Kubota discloses a trench capacitor (105/130/113); and a select transistor (102), comprising: a diffusion region forming a source/drain (120) electrode of the select transistor; a bit line contact (108) formed in an insulator layer (107) and comprising a filling comprising a metal, wherein the bit line contact connects the

source/drain region to an associated bit line (120) (See Fig. 4); and a doped region (19) formed completely within the source/drain electrode, wherein the doped region is completely surrounded by the source/drain electrode except for a surface to contact the filling of the bit-line contact (see fig. 1B), the doped region comprising a locally limited electrically conductive contact layer (121) which is formed substantially underneath the bit-line contact in the diffusion region and which has a relatively reduced lateral migration underneath the insulator layer adjoining the bit-line contact (See fig. 1B).

Re claim 14, Kubota discloses wherein the select transistor (102) is at least partially disposed in the substrate and the trench capacitor is completely disposed in the semiconductor substrate (100) (See Fig. 1B).

Re claim 16, Kubota discloses wherein the memory cell is part of a memory cell arrangement comprising peripheral contacts that are formed in a same structure plane and comprising a filling substantially similar to that of the bit-line contact (See abstract).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 15, 17 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kubota as applied to claims 11, 14 and 16 above, and further in view of Lu (6,218,639).

Kubota does not specifically disclose the material of the bit-line contact.

Re claim 15, Lu discloses wherein the bit-line contact comprises at least one or tungsten, aluminum and copper (Col. 2, lines 34-41).

It would have been within the scope of one of ordinary skill in the art to combine the teachings of Kubota and Lu to enable the bit-line material of Kubota to be the same according to the teachings of Lu because one of ordinary skill in the art would have been motivated to look to alternative suitable materials for the disclosed bit-line contact of Kubota and art recognized suitability for an intended purpose has been recognized to be motivation to combine. See MPEP 2144.07.

Re claim 17, Lu discloses wherein the bit-line contact further comprises a liner (barrier) layer formed between the substrate and the filling of the bit-line contact (Col. 2, lines 34-41).

Re claim 18, Lu discloses wherein the liner layer comprises Ti/TiN (Col. 2, lines 34-41).

Claims 19-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kubota as applied to claims 11, 14 and 16 above, and further in view of Bollinger et al. (6,762,136), and further in view of Lu.

Re claim 19, Kubota does not disclose an annealed region formed as a result of an anneal process performed during fabrication of the bit-line contact.

Bollinger et al. disclose an annealed region formed in the silicon substrate after implantation of the doping material (Col. 2, lines 10-14).

It would have been within the scope of one of ordinary skill in the art to combine the teachings of Kubota and Bollinger et al. to enable the annealed region formation step of Bollinger et al. to be performed in the process of Kubota because the annealing will repair the crystal damage done by the implant process in the bit-line contact (Col. 2, lines 13-14).

Re claim 20, Bollinger et al. discloses wherein the annealed region includes a damage region damaged during a doping process performed to form the doped region (Col. 2, lines 10-15).

Re claim 21, Bollinger et al. disclose wherein the annealed region includes at least a portion of the doped region (Col. 2, lines 10-15).

Kubota does not specifically disclose the material of the bit-line contact.

Re claim 22, Lu discloses wherein the bit-line contact comprises at least one of tungsten, aluminum and copper (Col. 2, lines 34-41).

It would have been within the scope of one of ordinary skill in the art to combine the teachings of Kubota and Lu to enable the bit-line material of Kubota to be the same according to the teachings of Lu because one of ordinary skill in the art would have been motivated to look to alternative suitable materials for the disclosed bit-line contact

of Kubota and art recognized suitability for an intended purpose has been recognized to be motivation to combine. See MPEP 2144.07.

Re claim 23, Lu discloses wherein the liner layer comprises Ti/TiN (Col 2, lines 35-37).

Re claim 24, Lu discloses wherein another source/drain electrode (17) of the select transistor is connected to an electrode (34) of the trench capacitor, which is completely disposed in the substrate (See Fig. 4 and Col. 3, lines 55-58).

### ***Response to Arguments***

In view of Applicant's explanation of the language "wherein the doped region is completely surrounded by the source/drain electrode except for a surface to contact the filling of the bit-line contact", the Examiner maintains the previous rejection because the reference is encompassed by the instant claims. Kubota's region 121 is a doped region completely surrounded by the source/drain electrode (120) except for a surface to contact the filling of the bit-line contact (see fig. 1B).

Applicant argues that 121 is not completely with layer 120, and is merely surrounded on its side portions, but open through the bottom portion (See page 6 of the arguments filed 2/23/06). However, region 121 is completely surrounded by region 120, the fact that at the bottom it seems to touch each other does not mean that 120 does not surround 121. Kubota does not disclose that the bottom of 121 is open on the

bottom portion. The definition of "surround" is to enclose on all sides (See Merriam-Webster online dictionary) and region 121 is enclose by region 120 in fig. 1B.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michelle Estrada whose telephone number is 571-272-1858. The examiner can normally be reached on Monday through Friday.



If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Smith can be reached on 571-272-1907. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 571-272-2800.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Michelle Estrada  
Primary Examiner  
Art Unit 2823

ME  
July 24, 2006